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BOOKS.

The Principles of Mathematical Physics. By Henri Poincairé. Translated by George Bruce Halsted. Pamphlet, 24 pages.

This is a translation of the French savant's address delivered before the International Congress of Arts and Science, at St. Louis, Mo., September, 1904. B. F. F.

Principles of Physics, for Academies, High Schools, and Normal Schools. By Louis Begeman, M. S., Professor of Physics, Iowa State Normal School. 8vo. Cloth, 267 pages. Chicago: Ainsworth & Co.

A splendid work, well suited to elementary instruction. B. F. F.

Exercises in Algebra. By Edward R. Robbins and F. H. Summerville, William Penn Charter School, Philadelphia, Penn. 8vo. Half Leather, 173 pages. New York and Chicago: American Book Co.

This little book will be found helpful to those teachers wishing to supplement the exercises in the text-book they are using. B. F. F.

An Elementary Treatise on the Differential Calculus, founded on the Method of Rates. By William Woolsey Johnson, Professor of Mathematics at the U. S. Naval Academy, Annapolis, Md. Small 8vo. Cloth, xiv+406 pages, 70 figures. Price, $3.00. New York: John Wiley & Sons.

This book is not a revision of the earlier work published by the same author in connection with J. M. Rice, but it is essentially new. The order of subjects differs from the older work, though the method of treatment is very much the same. The author still employs the Newtonian conception of rates, but more closely connected with the method of limits. Each chapter has at the close a fine collection of problems demanding in a variety of ways the applications of the principles therein established. B. F. F.

Statistical Methods with Special Reference to Biological Variation. By C. B. Davenport, Head of the Department of Experimental Biology and Director of Station for Experimental Evolution of the Carnegie Institution. Second Edition, Enlarged. 16mo. Morroco, viii+223 pages. Price, $1.50. New York: John Wiley & Sons.

This edition in addition to the matter contained in the first edition, embodies many of the new statistical methods elaborated chiefly by Prof. Karl Pearsons, his students and associates, and presents a summary of the results gained by these methods. B. F. F.

A Geometrical Political Economy. Being an Elementary Treatise on the Method of Explaining some of the Theories of Pure Economic Science by means of Diagrams. By H. Cunynghame, C. B., M. A., Oxford. At the Clarendon Press, 1904, 128 pp.

This little book is addressed to economists rather than to mathematicians. According to the author (p. 127) "The chief function of Mathematics as applied to Economics is, not to solve problems, but to help us to comprehend truths, which when we have comprehended we may discard the Mathematics as we take down a scaffolding when the building is finished.

Chapter I contains a bibliography of books on this mode of treating Political Economy, supplementing the one in Jevon's *Theory of Political Economy* (3rd ed. 1879).

Chapter II begins with a defense of mathematics against the prejudice which many students of economics feel. "Mathematical reasoning," says the author, "is only 'ordinary reasoning' assisted by a shorthand mode of expression that enables a proposition to be put in a line and visible in one glance of the eye rather than spread over ten or twelve pages of print. The remainder of the chapter discusses, as the title indicates, Geometrical Diagrams. The fundamental notions of drawing to a scale and change of axes are introduced by means of simple examples, then the terms: axes of coördinates, abscissa, origin, are defined and the methods of adding, subtracting, multiplying and dividing curves are explained and illustrated. Curves are divided into two classes: those which group and present facts, and those which represent laws; the latter are the ones dealt with in this treatise.

In Chapter III, on Demand Curves, money is taken as a standard of value, the reason being that the author desires to have for the simplicity of exposition a unit which may be regarded as invariable. Otherwise, if we consider the demand for (say) linen in terms of cloth, a diminishing utility of linen as it is supplied, involves a changing utility of cloth which its supply brings about (p. 105). In Chapter IV it is shown that a demand curve is a curve of final-utility prices; and one sees easily the characteristic feature of demand curves: that they are *descending curves, i. e.* with increasing quantity x, the price y decreases. The product xy denotes the total amount paid for the quantity x, and since people would not give a larger total sum for a smaller quantity of an article than for a larger, the demand curve will cut a rectangular hyperbola xy=constant, negatively (p. 42).

In Chapter V it is shown that Supply Curves are of three types: ascending (agricultural form), constant (industrial form), descending (manufacturing form). The intersection of the demand and supply curves gives the quantity of the article produced and sold.

Chapters VI—X are devoted chiefly to applications of the principles and methods explained above.

In Chapter XI the author explains the "Marshall's Curves," the applications which are made however go beyond those of the inventor. These curves were introduced for the purpose of eliminating the money standard in comparing two articles. Instead of having abscissa and ordinate denote quantity and prices per article, Marshall makes them denote total quantities exchanged. Thus if x and y denote abscissa and ordinate of a point on the price curve, where x=quantity taken, y=price per article, the abscissa and ordinate on a Marshall curve would x and $y=xy$.

On page 83, Fig. 41, two different points are denoted by the letter S. This should be changed to obviate confusion. On page 2 curves are spoken of as those which do and those which do not obey some law. By this the author seems to mean curves for which equations are or are not known. On page 7, it is stated that "mathematics is the science of quantity." In this connection Professor Bocher of Harvard University says:* "the old idea that mathematics is the science of quantity . . . . has pretty well passed away among those mathematicians who have given any thought to the question of what mathematics really is."

On the whole Mr. Cunynghame has carried out creditably his delicate task of writing a book on a subject which is neither Mathematics nor Economics, but is, as the title page states, "an elementary treatise on the method of explaining some of the theories of pure economics by means of diagrams." SAUL EPSTEEN.

**The Fundamental Conceptions and Methods of Mathematics.* By Maxime Bocher. Address delivered before the Department of Mathematics of the International Congress of Arts and Science, St. Louis, September 20, 1904. Printed in the Bulletin of the American Mathematical Society, Vol. XI, No. 3, Dec. 1904, pp. 115—135.